

What is Claimed Is:

1. A method in an integrated network switch having a switching module, the integrated network switch configured for switching a layer 2 packet, the method comprising:

determining whether the layer 2 packet includes prescribed layer 3 packet information;

selectively performing layer 3 switching based on the determined presence of the prescribed

5 layer 3 packet information, including determining a switching operation based on at least one of a layer 3 source address and a layer 3 destination address; and

selectively performing layer 2 switching based on the determined absence of the prescribed layer 3 packet information.

2. The method of claim 1, wherein the determining step includes first detecting a presence of an Internet Protocol (IP) header within the layer 2 packet as the prescribed layer 3 packet information.

3. The method of claim 2, wherein the step of selectively performing layer 3 switching includes second detecting whether the IP header specifies a prescribed network identifier and a prescribed subnetwork identifier.

4. The method of claim 3, wherein the second detecting step includes comparing a source IP address within the IP header with a table configured for storing a plurality of the prescribed subnetwork identifiers.

5. The method of claim 4, wherein the step of selectively performing layer 3 switching further includes obtaining layer 3 switching information from the table based on a match between subnetwork identifier information within the IP header and a corresponding one of the prescribed subnetwork identifiers.

6. The method of claim 4, wherein the step of selectively performing layer 3 switching further includes dropping the layer 2 packet based on a determined absence of any one of the prescribed subnetwork identifiers within the source IP address.

7. The method of claim 2, wherein the step of selectively performing layer 2 switching includes accessing a layer 2 switching table, based on layer 2 packet information, in response to the

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determining step determining that the layer 2 packet includes one of an IPX frame and a DECnet frame.

8. The method of claim 1, wherein the step of selectively performing layer 3 switching includes dropping the layer 2 packet in response to determining that the layer 2 packet includes a time to live (TTL) field having a value equal to zero.

9. The method of claim 8, wherein the step of selectively performing layer 3 switching includes:

obtaining layer 3 switching information based on the determined presence of the prescribed layer 3 packet information and based on determining that the TTL field has a value greater than zero;

5 and

decrementing the TTL field prior to outputting the layer 2 packet based on the obtained layer 3 switching information.

10. The method of claim 9, wherein the step of selectively performing layer 3 switching further includes:

second determining whether the layer 2 packet includes a destination MAC address specifying a router and a destination IP address specifying a network node within a prescribed subnetwork; and

5 selectively replacing the destination MAC address specifying the router with a second MAC address specifying the network node, based on the second determining step.

11. The method of claim 10, wherein the step of selectively performing layer 3 switching further includes recalculating an IP checksum and MAC cyclic redundancy check based on the selective replacement of the destination MAC address with a second MAC address.

12. The method of claim 1, wherein the step of selectively performing layer 3 switching includes:

determining a presence of a valid subnetwork identifier within the prescribed layer 3 packet information; and

5 obtaining layer 3 switching information from one of a first table configured for storing switching entries for respective prescribed subnetwork identifiers, and a second table configured for storing switching entries for respective Internet protocol (IP) addresses, based on whether the prescribed layer 3 packet information includes the valid subnetwork identifier.

CONTINUATION

13. The method of claim 12, wherein the obtaining step includes accessing the switching information from a selected one of the switching entries in the first table in response to detecting the valid subnetwork identifier within the prescribed layer 3 packet information.

14. An integrated network switch having a switching module comprising:
an evaluation module configured for evaluating a presence of layer 3 packet information within a received layer 2 packet, the evaluation module configured for identifying selected layer 3 switching functions to be performed based on the determined presence of prescribed data within the
5 layer 3 packet information;

an address table configured for storing switching entries, each switching entry configured for storing a layer 2 network address, a layer 3 network address, and corresponding switching information;

10 an address lookup module configured for searching the switching entries based on at least one of the layer 3 packet information and layer 2 address information in the received layer 2 packet; and
an output module configured for generating a switching decision based on the searching of the switching entries by the address lookup module and the evaluation of the presence of layer 3 packet information.

15. The switch of claim 14, wherein the evaluation module includes:
a rules queue configured for generating status information for the received layer 2 packet; and
an ingress module configured for parsing the received layer 2 packet for layer 2 address information and layer 3 address information and determining whether the received layer 2 packet
5 should be dropped based on the layer 2 address information, the evaluation of the presence of layer 3 packet information, and the status information.

16. The switch of claim 15, wherein the ingress module is configured for identifying within the received layer 2 packet a media access control (MAC) source address, a MAC destination address, an Internet Protocol (IP) source address, an IP destination address, and a nonzero time to live (TTL) field.

17. The switch of claim 16, wherein the ingress module is configured for dropping the layer 2 packet in response to detecting the TTL field having a zero value.

18. The switch of claim 16, wherein the address lookup module includes a source address lookup module configured for selectively storing the MAC source address and corresponding IP source address of a determined non-router network node having transmitted the received layer 2 packet.

19. The switch of claim 18, further comprising a subnetwork table configured for storing switching entries each specifying a subnetwork identifier and a corresponding switching information, the address lookup module further including a destination address module configured for obtaining the switching information from a selected switching entry of one of address table and the subnetwork table

5 based on at least one of the IP destination address and the MAC destination address.

20. The switch of claim 14, wherein the output module assigns the switching decision a prescribed priority based on the identified selected layer 3 switching functions to be performed based on the determined presence of the prescribed data within the layer 3 packet information.

21. The switch of claim 20, wherein the output module decrements a detected nonzero time to live (TTL) field within the layer 3 packet information.

22. The switch of claim 20, wherein the output module replaces a destination MAC address in the received layer 2 packet, determined as corresponding to a layer 2 router address, with a second MAC address based on a detected destination IP address in the layer 3 packet information specifying a second network node identified in one of the switching entries.

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